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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,805	02/20/2004	Rajesh Venkat Subbu	52493.000361	5189

21967 7590 03/28/2008
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EXAMINER

NEWTON, JARED W

ART UNIT	PAPER NUMBER
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3693

MAIL DATE	DELIVERY MODE
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03/28/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/781,805	Applicant(s) SUBBU ET AL.	
	Examiner JARED W. NEWTON	Art Unit 3693	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>11/04/04; 1/11/08; 1/16/08; 1/22/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 8 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. It is unclear how the recitation "wherein the non-dominated subset is further committed to memory" limits the recitation "committing the non-dominated subset to a . . . archive."

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4, 10-18 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantially" in claim 4 is a relative term which renders the claim indefinite. The term is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim 10 is generally indefinite. For instance, the recitations, "wherein the previously generated non-dominated subset being formed by" and "the processing the

population of solutions of portfolio allocations includes” are unclear. For purposes of examination, the claim has been interpreted to recite the following:

“The method of claim 9, wherein the non-dominated subset of the offspring solutions is combined with a previously generated non-dominated subset, into a larger set of solutions;

wherein the previously generated non-dominated subset is formed by the evolutionary algorithm process creating a population of solutions of a certain cardinality by randomly drawing solutions from an initial population archive; and

wherein the processing of the population of solutions includes:

passing the population through a dominance filter;

identifying a non-dominated subset; and

committing the non-dominated subset to a non-dominated solutions archive.”

Claims 11-18 are rejected under this section because they depend from claim 10.

Claims 12-14 are further rejected under this section because it is unclear which set the recitation "the filtered solutions set" refers to. Claims 12-14 depend from claim 11, which recites, "to result in a filtered solutions set"; however, claims 12-14 also depend from claim 10, which discloses a set of solutions that has been passed through a filter, resulting in a filtered solutions set. One of ordinary skill in the art would not be certain which filtered set claims 12-14 further define.

Claim 18 is further rejected under this section because it seeks to modify a term that is not required by the claim on which claim 18 depends. Claim 18 recites, “wherein the final non-dominated solutions archive . . .” However, claim 18 depends from claim

17, which sets forth the "final non-dominated solutions archive" as a conditional claim limitation. According to claim 17, "a final non-dominated solutions archive" is only generated when "allocated computational cycles are exhausted;" and "allocated computational cycles" are not exhausted if "convergence is achieved" first. Therefore if a prior art reference can show that "convergence is achieved," then the limitations of claim 18 are not required.

Claim 26 is rejected under this section because it is generally indefinite. For instance, the recitations, "wherein the previously generated non-dominated subset being formed by" and "the processing the population of solutions of portfolio allocations includes" are unclear (see lines 16-25). For purposes of examination, lines 16-25 of the claim have been interpreted to recite the following:

"wherein the non-dominated subset of the offspring solutions is combined with a previously generated non-dominated subset, into a larger set of solutions;

wherein the previously generated non-dominated subset is formed by the evolutionary algorithm process creating a population of solutions of a certain cardinality by randomly drawing solutions from an initial population archive; and

wherein the processing of the population of solutions includes:

passing the population through a dominance filter;

identifying a non-dominated subset; and

committing the non-dominated subset to a non-dominated solutions archive."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 19, 20 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 7,155,423 to Josephson et al. (hereafter Josephson).

In regard to claim 1, Josephson discloses a system and method for multi-criteria decision making, wherein said system and method are used for portfolio optimization in investment decisions based on competing objectives and a plurality of constraints (see e.g. col. 4, lines 15-19); the method comprising:

generating an initial population of solutions for the portfolio allocation (see col. 4, lines 8-19);

committing the initial population of solutions to an archive (see col. 4, lines 25-28);

performing a multi-objective process, based on the initial population archive and on multiple competing objectives, to generate an efficient frontier, the multi-objective process including an evolutionary algorithm process that utilizes a dominance filter (see col. 4, lines 29-34).

In regard to claim 2, Josephson discloses the multiple competing objectives as governed by risk and return measures (see FIG. 23). Josephson discloses variance (a measure of risk) as a first objective, and price/earnings ratio (a measure of return) as a second objective (see col. 27, lines 50-64).

In regard to claim 3, Josephson discloses evaluation based on additional objectives (see col. 27, lines 43-50).

In regard to claim 4, *insomuch as understood in view of the 35 U.S.C. § 112 Rejection above*, Josephson discloses the initial population of solutions as substantially covering the entire risk/return objective space (see col. 4, lines 20-25 – Josephson discloses evaluation of “candidates in many different domains”); and the initial population of solutions as committed to an archive (see col. 4, lines 25-28).

In regard to claims 19, 20 and 25, the claimed limitations are deemed anticipated by Josephson. Josephson discloses the method disclosed above with respect to claims 1-4, and further discloses a system and computer product for carrying out the method (see claim 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Josephson, as applied to claims 1-4, 19, 20 and 25, alone.

In regard to claim 5, Josephson discloses the method of claims 1-4 as set forth above, but does not explicitly disclose the use of linear programming and sequential linear programming algorithms; however, it would have been obvious to one of ordinary skill in the art at the time of the invention to use these problem solving techniques to optimize the multi-objective process disclosed by Josephson. Linear programming and sequential linear programming were well known at the time of the invention as methods for optimizing objective functions subject to constraints.

Claims 6-18 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Josephson, as applied to claims 1-4, 19, 20 and 25 above, in view of US Patent Application Publication No. 2003/0233304 to Dhurandhar et al. (hereafter Dhurandhar).

In regard to claim 6, Josephson discloses the limitations of claim 1 as set forth above, including the generation of a population of solutions, but does not explicitly disclose the generated population of solutions defined by a certain cardinality achieved by randomly drawing solutions from an initial population.

Dhurandhar discloses a system and method for optimization of multi-objective functions, wherein the method utilizes an evolutionary algorithm that is generated by randomly selecting candidate solutions from an initial population, thereby creating solution sets having a particular cardinality (see [0233]; see also [0121]-[0123]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to randomly select candidates from the initial population disclosed by Josephson. The motivation would be that as disclosed by Dhurandhar--to provide robust results for the candidate solutions in a given domain.

In regard to claim 7, Josephson discloses the passing of the population of solutions through a dominance filter; the identification of a non-dominated subset of the population; and the committing of the subset to a solutions archive (see col. 4, lines 29-44).

In regard to claim 8, it is inherent within the disclosure of Josephson that the non-dominated subset is committed to memory.

In regard to claim 9, Josephson discloses the method of claim 1 as set forth above, and further discloses the use of a dominance filter to identify a non-dominated subset of candidate solutions; however, Josephson does not explicitly disclose combining randomly matched pairs of parent solutions to create offspring solutions.

Dhurandhar discloses the use of the evolutionary algorithm as set forth above, wherein said algorithm combines randomly matches pairs of parent solutions to generate offspring solutions (see [0234]-[0236]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the parent/offspring evolutionary equations disclosed by Dhurandhar to the candidate solutions disclosed by Josephson, to create a non-dominated subset of the offspring solutions. The motivation would be that as disclosed by Dhurandhar -- to move the evolutionary process toward promising regions of the domain.

In regard to claim 10, *insomuch as understood in view of the 35 U.S.C. § 112 Rejections above*, Josephson in view of Dhurandhar discloses the method of claim 9, wherein the non-dominated subset of solutions is combined with a previously generated non-dominated subset, into a larger set of solutions (see e.g. Josephson, claim 1);

wherein the previously generated non-dominated subset is formed by the evolutionary algorithm process creating a population of solutions of a certain cardinality by randomly drawing solutions from an initial population archive (as set forth in the claim 6 rejection above); and

wherein the processing of the population of solutions includes:
passing the population through a dominance filter (as set forth in the claim 1 rejection above);

identifying a non-dominated subset (id.); and

committing the non-dominated subset to a non-dominated solutions archive (id.).

In regard to claim 11, Josephson in view of Dhurandhar discloses the limitations of claims 1, 9 and 10 above, and Josephson further discloses a non-crowding filter (see col. 23, lines 47-64).

In regard to claims 12-16, *insomuch as understood in view of the 35 U.S.C. § 112 Rejections above*, Josephson does not explicitly disclose adjusting the cardinality of the population of solutions.

Dhurandhar discloses the adjusting of the cardinality of multiple sets of solutions (see [0122]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the cardinality of the filtered sets of solutions disclosed by Josephson to promote uniformity among the various sets.

In regard to claim 17, Josephson discloses repetition of the evolutionary algorithm process (see e.g. Josephson, claim 1); however, Josephson does not explicitly disclose the repetition ending when convergence is achieved.

Dhurandhar discloses ending repetition of the evolutionary algorithm when convergence is achieved (see [0233]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to repeat the process of Josephson until convergence is met as disclosed by Dhurandhar. The motivation would be to avoid unnecessary iterations of the evolutionary algorithm process, and thereby improve the efficiency of the method.

In regard to claim 18, *insomuch as understood in view of the 35 U.S.C. § 112 Rejections above*, Josephson discloses repeatedly passing the non-dominated solutions through a dominance filter to yield the efficient frontier (see col. 4, lines 29-44; see also claim 1).

In regard to claims 21-24, the limitations are deemed unpatentable over Josephson in view of Dhurandhar, as applied to claims 1-20 above. Josephson in view of Dhurandhar discloses the method disclosed above with respect to claims 1-19, and Josephson further discloses a system and computer product for carrying out the method (see claim 1).

In regard to claim 26, the limitations are deemed unpatentable over Josephson in view of Dhurandhar, as applied above with respect to claims 1-18.

With respect to the above rejections, the Examiner has cited particular portions of the reference(s), and although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested that the Applicant consider each cited reference in its entirety as potentially teaching the limitations of the claimed invention.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- US Patent No. 6,771,293 to Josephson et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JARED W. NEWTON whose telephone number is (571)272-2952. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Kramer can be reached on (571) 272-6783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 3693

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James A. Kramer/
Supervisory Patent Examiner, Art Unit 3693

JWN
March 20, 2008